5.8.2 *Scenario 2: Marine Mammal Subsistence Diet for Combined Source of Cannikin, Long Shot, and Milrow (No Kelp)*

5.8.2.1 *Base Case*

A plot of the modeled lifetime risk values for the mean radionuclide flux for the marine mammal subsistence dietary exposure scenario for the combined source of Cannikin, Long Shot, and Milrow (no kelp), base-case groundwater model, along with the plot for the mean plus 2 standard deviations, is shown in Figure 6A for the entire modeled period. The maximum lifetime risk value for the mean radionuclide flux was 5.3×10^{-11} lifetime excess cancer risk (Table 7), which is more than 10,000-fold lower than EPA's point of departure for risk of 1.0×10^{-6}. The maximum lifetime risk value for the mean radionuclide flux plus 2 standard deviations was 8.9×10^{-10} (Table 7), which is more than 1,000-fold lower than the EPA's point of departure for risk.

The maximum modeled lifetime risk for the mean radionuclide flux was for exposure that began in 1990. Lifetime risks are predicted to have decreased for exposures that have begun since that year to the current value of 5.0×10^{-11}, and will continue to decrease in the future (Figure 6A).

5.8.2.2 *Groundwater Modeling Sensitivity Case*

A plot of the modeled lifetime risk values for the mean radionuclide flux for the marine mammal subsistence dietary exposure scenario for the combined source of Cannikin, Long Shot, and Milrow (no kelp), sensitivity-case groundwater model, along with the plot for the mean plus 2 standard deviations, is shown in Figure 6B for the entire modeled period. The maximum lifetime risk value for the mean radionuclide flux was 9.7×10^{-9} lifetime excess cancer risk (Table 7), which is more than 100-fold lower than EPA's point of departure for risk of 1.0×10^{-6}. The maximum lifetime risk value for the mean radionuclide flux plus 2 standard deviations was 9.4×10^{-8} (Table 7), which is more than 10-fold lower than the EPA point of departure for risk.

The maximum modeled lifetime risk for the mean radionuclide flux was for exposure that began in 1968. Lifetime risks are predicted to have decreased for exposures that have begun since that year to the current value of 3.8×10^{-9}, and will continue to decrease in the future (Figure 6B).

5.8.2.3 Conclusion

All of the modeled lifetime risk values for the mean radionuclide flux (as well as the mean plus 2 standard deviation values) during the entire 1,000-year period evaluated for this dietary exposure, location, and base-case model and sensitivity-case models are far below EPA's point of departure for risk.

5.8.3 Scenario 3: Commercial Catch Diet for Combined Source of Cannikin, Long Shot, and Milrow (No Kelp)

5.8.3.1 Base Case

A plot of the modeled lifetime risk values for the mean radionuclide flux for the commercial catch dietary exposure scenario for the combined source of Cannikin, Long Shot, and Milrow (no kelp), base-case groundwater model, along with the plot for the mean plus 2 standard deviations, is shown in Figure 7A for the entire modeled period. The maximum lifetime risk value for the mean radionuclide flux was 4.2×10^{-12} lifetime excess cancer risk (Table 7), which is more than 200,000-fold lower than EPA's point of departure for risk of 1.0×10^{-6}. The maximum lifetime risk value for the mean radionuclide flux plus 2 standard deviations was 7.0×10^{-11} (Table 7), which is more than 10,000-fold lower than the EPA's point of departure for risk.

The maximum modeled lifetime risk for the mean radionuclide flux was for exposure that began in 1993. Lifetime risks are predicted to have decreased for exposures that have begun since that year to the current value of 4.1×10^{-12}, and will continue to decrease in the future (Figure 7A).

5.8.3.2 Groundwater Modeling Sensitivity Case

A plot of the modeled lifetime risk values for the mean radionuclide flux for the commercial catch dietary exposure scenario for the combined source of Cannikin, Long Shot, and Milrow (no kelp), sensitivity-case groundwater model, along with the plot for the mean plus 2 standard deviations, is shown in Figure 7B for the entire modeled period. The maximum lifetime risk value for the mean radionuclide flux was 7.4×10^{-10} lifetime excess cancer risk (Table 7), which is more than 1,000-fold lower than EPA's point of departure for risk of 1.0×10^{-6}. The maximum lifetime risk value for the mean radionuclide flux plus 2 standard deviations was 7.2×10^{-9} (Table 7), which is more than 100-fold lower than the EPA's point of departure for risk.

The maximum modeled lifetime risk for the mean radionuclide flux was for exposure that began in 1968. Lifetime risks are predicted to have decreased for exposures that have begun since that year to the current value of 3.4×10^{-10}, and will continue to decrease in the future (Figure 7B).

5.8.3.3 Conclusion

All of the modeled lifetime risk values for the mean radionuclide flux (as well as the mean plus 2 standard deviation values) during the entire 1,000-year period evaluated for this dietary exposure, location, and base-case model and sensitivity-case models are far below EPA's point of departure for risk.

5.8.4 Scenario 4: Fish Subsistence Diet for Combined Source of Cannikin, Long Shot, and Milrow (With Kelp)

5.8.4.1 Base Case

A plot of the modeled lifetime risk values for the mean radionuclide flux for the fish subsistence dietary exposure scenario for the combined source of Cannikin, Long Shot, and Milrow (with kelp), base-case groundwater model, along with the plot for the mean plus 2 standard deviations, is shown in Figure 8A for the entire modeled period. The maximum lifetime risk value for the mean radionuclide flux was 9.7×10^{-11} lifetime excess cancer risk (Table 7), which is more than 10,000-fold lower than EPA's point of departure for risk of 1.0×10^{-6}. The maximum lifetime risk value for the mean radionuclide flux plus 2 standard deviations was 1.6×10^{-9} (Table 7), which is more than 500-fold lower than the EPA's point of departure for risk.

The maximum modeled lifetime risk for the mean radionuclide flux was for exposure that began in 1994. Lifetime risks are predicted to have decreased for exposures that have begun since that year to the current value of 9.6×10^{-11}, and will continue to decrease in the future (Figure 8A).

5.8.4.2 Groundwater Modeling Sensitivity Case

A plot of the modeled lifetime risk values for the mean radionuclide flux for the fish subsistence dietary exposure scenario for the combined source of Cannikin, Long Shot, and Milrow (with kelp), sensitivity-case groundwater model, along with the plot for the mean plus 2 standard deviations, is shown in Figure 8B for the entire modeled period. The maximum lifetime risk value for the mean radionuclide flux was 1.9×10^{-8} lifetime excess cancer risk (Table 7), which is more than 50-fold lower than EPA's point of departure for risk of 1.0×10^{-6}. The maximum lifetime risk value for the mean radionuclide flux plus 2 standard deviations was 2.3×10^{-7} (Table 7), which is more than 5-fold lower than the EPA's point of departure for risk.

The maximum modeled lifetime risk for the mean radionuclide flux was for exposure that began in 1968. Lifetime risks are predicted to have decreased for exposures that have begun since that year to the current value of 9.2×10^{-9}, and will continue to decrease in the future (Figure 8B).

5.8.4.3 Conclusion

All of the modeled lifetime risk values for the mean radionuclide flux (as well as the means plus 2 standard deviation values) during the entire 1,000 year period evaluated for this dietary exposure location, and base-case model and sensitivity case models are below EPA's point of departure for risk.

5.8.5 Scenario 5: Marine Mammal Subsistence Diet for Combined Source of Cannikin, Long Shot, and Milrow (With Kelp)

5.8.5.1 Base Case

A plot of the modeled lifetime risk values for the mean radionuclide flux for the marine mammal subsistence dietary exposure scenario for the combined source of Cannikin, Long Shot, and Milrow (with kelp), base-case groundwater model, along with the plot for the mean plus 2 standard deviations, is shown in Figure 9A for the entire modeled period. The maximum lifetime risk value for the mean radionuclide flux was 5.3×10^{-11} lifetime excess cancer risk (Table 7), which is nearly 20,000-fold lower than EPA's point of departure for risk of 1.0×10^{-6}. The maximum lifetime risk value for the mean radionuclide flux plus 2 standard deviations was 8.9×10^{-10} (Table 7), which is more than 1,000-fold lower than the EPA's point of departure for risk.

The maximum modeled lifetime risk for the mean radionuclide flux was for exposure that began in 1990. Lifetime risks are predicted to have decreased for exposures that have begun since that year to the current value of 5.0×10^{-11}, and will continue to decrease in the future (Figure 9A).

5.8.5.2 Groundwater Modeling Sensitivity Case

A plot of the modeled lifetime risk values for the mean radionuclide flux for the marine mammal subsistence dietary exposure for the combined source of Cannikin, Long Shot, and Milrow (with kelp), sensitivity-case groundwater model scenario, along with the plot for the mean plus 2 standard deviations, is shown in Figure 9B for the entire modeled period. The maximum lifetime risk value for the mean radionuclide flux was 1.1×10^{-8} lifetime excess cancer risk (Table 7), which is nearly 100-fold lower than EPA's point of departure for risk of 1.0×10^{-6}. The maximum lifetime risk value for the mean radionuclide flux plus 2 standard deviations was 1.3×10^{-7} (Table 7), which is nearly 8-fold lower than the EPA's point of departure for risk.

The maximum modeled lifetime risk for the mean radionuclide flux was for exposure that began in 1968. Lifetime risks are predicted to have decreased for exposures that have begun since that year to the current value of 4.3×10^{-9}, and will continue to decrease in the future (Figure 9B).

5.8.5.3 Conclusion

All of the modeled lifetime risk values for the mean radionuclide flux (as well as the mean plus 2 standard deviation values) during the entire 1,000-year period evaluated for this dietary exposure, location, and base-case model and sensitivity-case models are far below EPA's point of departure for risk.

5.8.6 Scenario 6: Commercial Catch Diet for Combined Source of Cannikin, Long Shot, and Milrow (With Kelp)

5.8.6.1 Base Case

A plot of the modeled lifetime risk values for the mean radionuclide flux for the commercial catch dietary exposure scenario for the combined source of Cannikin, Long Shot, and Milrow (with kelp), base-case groundwater model, along with the plot for the mean plus 2 standard deviations, is shown in Figure 10A for the entire modeled period. The maximum lifetime risk value for the mean radionuclide flux was 4.2×10^{-12} lifetime excess cancer risk (Table 7), which is more than 200,000-fold lower than EPA's point of departure for risk of 1.0×10^{-6}. The maximum lifetime risk value for the mean radionuclide flux plus 2 standard deviations was 7.0×10^{-11} (Table 7), which is more than 10,000-fold lower than the EPA's point of departure for risk.

The maximum modeled lifetime risk for the mean radionuclide flux was for exposure that began in 1993. Lifetime risks are predicted to have decreased for exposures that have begun since that year to the current value of 4.1×10^{-12}, and will continue to decrease in the future (Figure 10A).

5.8.6.2 Groundwater Modeling Sensitivity Case

A plot of the modeled lifetime risk values for the mean radionuclide flux for the commercial catch dietary exposure scenario for the combined source of Cannikin, Long Shot, and Milrow (with kelp), sensitivity-case groundwater model, along with the plot for the mean plus 2 standard deviations, is shown in Figure 10B for the entire modeled period. The maximum lifetime risk value for the mean radionuclide flux was 7.9×10^{-10} lifetime excess cancer risk (Table 7), which is more than 1,000-fold lower than EPA's point of departure for risk of 1.0×10^{-6}. The maximum lifetime risk value for the mean radionuclide flux plus 2 standard deviations was 8.7×10^{-9} (Table 7), which is more than 100-fold lower than the EPA's point of departure for risk.

The maximum modeled lifetime risk for the mean radionuclide flux was for exposure that began in 1968. Lifetime risks are predicted to have decreased for exposures that have begun since that year to the current value of 3.7×10^{-10}, and will continue to decrease in the future (Figure 10B).

5.8.6.3 Conclusion

All of the modeled lifetime risk values for the mean radionuclide flux (as well as the mean plus 2 standard deviation values) during the entire 1,000-year period evaluated for this dietary exposure, location, and base-case model and sensitivity-case models are far below EPA's point of departure for risk.

5.8.7 Scenario 7: Fish Subsistence Diet for Combined Sources in the Aleut Culture and Communication Area

5.8.7.1 Base Case

A plot of the modeled lifetime risk values for the mean radionuclide flux for the fish subsistence dietary exposure scenario for the combined sources of Cannikin, Long Shot, and Milrow, base-case groundwater model in the Aleut culture and communication area, along with the plot for the mean plus 2 standard deviations, is shown in Figure 11A for the entire modeled period. The maximum lifetime risk value for the mean radionuclide flux was 2.1×10^{-11} lifetime excess cancer risk (Table 7), which is nearly 50,000-fold lower than EPA's point of departure for risk of 1.0×10^{-6}. The maximum lifetime risk value for the mean radionuclide flux plus 2 standard deviations was 3.4×10^{-10} (Table 7), which is nearly 3,000-fold lower than the EPA's point of departure for risk.

The maximum modeled lifetime risk for the mean radionuclide flux was for exposure that began in 1994. Lifetime risks are predicted to have decreased for exposures that have begun since that year to the current value of 2.0×10^{-11}, and will continue to decrease in the future (Figure 11A).

5.8.7.2 Groundwater Modeling Sensitivity Case

A plot of the modeled lifetime risk values for the mean radionuclide flux for the fish subsistence dietary exposure scenario for the combined source in the Aleut culture and communication area, sensitivity-case groundwater model, along with the plot for the mean plus 2 standard deviations, is shown in Figure 11B for the entire modeled period. The maximum lifetime risk value for the mean radionuclide flux was 3.5×10^{-9} lifetime excess cancer risk (Table 7), which is nearly 300-fold lower than EPA's point of departure for risk of 1.0×10^{-6}. The maximum lifetime risk value for the mean radionuclide flux plus 2 standard deviations was 3.5×10^{-8} (Table 7), which is nearly 30-fold lower than the EPA's point of departure for risk.

The maximum modeled lifetime risk for the mean radionuclide flux was for exposure that began in 1968. Lifetime risks are predicted to have decreased for exposures that have begun since that year to the current value of 1.6×10^{-9}, and will continue to decrease in the future (Figure 11B).

5.8.7.3 Conclusion

All of the modeled lifetime risk values for the mean radionuclide flux (as well as the mean plus 2 standard deviation values) during the entire 1,000-year period evaluated for this dietary exposure, location, and base-case model and sensitivity-case models are far below EPA's point of departure for risk.

5.8.8 *Scenario 8: Marine Mammal Subsistence Diet for Combined Sources in the Aleut Culture and Communication Area*

5.8.8.1 *Base Case*

A plot of the modeled lifetime risk values for the mean radionuclide flux for the marine mammal subsistence dietary exposure scenario for the combined sources of Cannikin, Long Shot, and Milrow, base-case groundwater model in the Aleut culture and communication area, along with the plot for the mean plus 2 standard deviations, is shown in Figure 12A for the entire modeled period. The maximum lifetime risk value for the mean radionuclide flux was 1.1×10^{-11} lifetime excess cancer risk (Table 7), which is nearly 100,000-fold lower than EPA's point of departure for risk of 1.0×10^{-6}. The maximum lifetime risk value for the mean radionuclide flux plus 2 standard deviations was 1.9×10^{-10} (Table 7), which is more than 5,000-fold lower than the EPA's point of departure for risk.

The maximum modeled lifetime risk for the mean radionuclide flux was for exposure that began in 1990. Lifetime risks are predicted to have decreased for exposures that have begun since that year to the current value of 1.07×10^{-11}, and will continue to decrease in the future (Figure 12A).

5.8.8.2 *Groundwater Modeling Sensitivity Case*

A plot of the modeled lifetime risk values for the mean radionuclide flux for the marine mammal subsistence dietary exposure scenario for the combined sources in the Aleut culture and communication area, along with the plot for the mean plus 2 standard deviations, is shown in Figure 11B for the entire modeled period. The maximum lifetime risk value for the mean radionuclide flux was 2.0×10^{-9} lifetime excess cancer risk (Table 7), which is 500-fold lower than EPA's point of departure for risk of 1.0×10^{-6}. The maximum lifetime risk value for the mean radionuclide flux plus 2 standard deviations was 1.9×10^{-8} (Table 7), which is more than 50-fold lower than the EPA's point of departure for risk.

The maximum modeled lifetime risk for the mean radionuclide flux was for exposure that began in 1968. Lifetime risks are predicted to have decreased for exposures that have begun since that year to the current value of 7.7×10^{-10}, and will continue to decrease in the future (Figure 11B).

5.8.8.3 *Conclusion*

All of the modeled lifetime risk values for the mean radionuclide flux (as well as the mean plus 2 standard deviation values) during the entire 1,000-year period evaluated for this dietary exposure, location, and base-case model and sensitivity-case models are far below EPA's point of departure for risk.

5.8.9 *Scenario 9: Commercial Catch Diet for Combined Sources in the Aleut Culture and Communication Area*

5.8.9.1 *Base Case*

A plot of the modeled lifetime risk values for the mean radionuclide flux for the commercial catch dietary exposure scenario for the combined sources of Cannikin, Long Shot, and Milrow, base-case groundwater model in the Aleut culture and communication area, along with the plot for the mean plus 2 standard deviations, is shown in Figure 13A for the entire modeled period. The maximum lifetime risk value for the mean radionuclide flux was 8.9×10^{-13} lifetime excess cancer risk (Table 7), which is more than 1,000,000-fold lower than EPA's point of departure for risk of 1.0×10^{-6}. The maximum lifetime risk value for the mean radionuclide flux plus 2 standard deviations was 1.5×10^{-11} (Table 7), which is more than 60,000-fold lower than the EPA's point of departure for risk.

The maximum modeled lifetime risk for the mean radionuclide flux was for exposure that began in 1993. Lifetime risks are predicted to have decreased for exposures that have begun since that year to the current value of 8.7×10^{-13}, and will continue to decrease in the future (Figure 13A).

5.8.9.2 *Groundwater Modeling Sensitivity Case*

A plot of the modeled lifetime risk values for the mean radionuclide flux for the commercial catch dietary exposure scenario for the combined sources in the Aleut culture and communication area, sensitivity-case groundwater model, along with the plot for the mean plus 2 standard deviations, is shown in Figure 13B for the entire modeled period. The maximum lifetime risk value for the mean radionuclide flux was 1.5×10^{-10} lifetime excess cancer risk (Table 7), which is more than 6,000-fold lower than EPA's point of departure for risk of 1.0×10^{-6}. The maximum lifetime risk value for the mean radionuclide flux plus 2 standard deviations was 1.4×10^{-9} (Table 7), which is more than 700-fold lower than the EPA's point of departure for risk.

The maximum modeled lifetime risk for the mean radionuclide flux was for exposure that began in 1968. Lifetime risks are predicted to have decreased for exposures that have begun since that year to the current value of 6.6×10^{-11}, and will continue to decrease in the future (Figure 13B).

5.8.9.3 Conclusion

All of the modeled lifetime risk values for the mean radionuclide flux (as well as the mean plus 2 standard deviation values) during the entire 1,000-year period evaluated for this dietary exposure, location, and base-case model and sensitivity-case models are far below EPA's point of departure for risk.

Table 8
Maximum Lifetime Risk Values for the Mean Radionuclide Flux Lifetime Excess Cancer Risks for Each of the 9 Risk Scenarios, Ranked from Highest to Lowest

Rank	Scenario Number	Dietary Exposure, Location Groundwater Model Type Combination	Base-Case Groundwater Model Scenarios		Sensitivity-Case Groundwater Model Scenarios	
			Maximum Lifetime Risk Values for Mean Radionuclide Flux	Maximum Lifetime Risk Values for Mean Radionuclide Flux + 2 S.D.	Maximum Lifetime Risk Values for Mean Radionuclide Flux	Maximum Lifetime Risk Values for Mean Radionuclide Flux + 2 S.D.
1	4	Fish subsistence diet exposure for combined Cannikin, Long Shot, and Milrow (with kelp)	9.7×10^{-11}	1.6×10^{-9}	1.9×10^{-8}	2.3×10^{-7}
2	1	Fish subsistence diet for combined Cannikin, Long Shot, and Milrow (with no kelp)	9.7×10^{-11}	1.6×10^{-9}	1.7×10^{-8}	1.8×10^{-7}
3	5	Marine mammal subsistence diet for combined Cannikin, Long Shot, and Milrow (with kelp)	5.3×10^{-11}	8.9×10^{-10}	1.1×10^{-8}	1.3×10^{-7}
4	2	Marine mammal subsistence diet for combined Cannikin, Long Shot, and Milrow (with no kelp)	5.3×10^{-11}	8.9×10^{-10}	9.7×10^{-9}	9.4×10^{-8}
5	7	Fish subsistence diet for Aleut culture and communication area	2.1×10^{-11}	3.4×10^{-10}	3.5×10^{-9}	3.5×10^{-8}
6	8	Marine mammal subsistence diet for Aleut culture and communication area	1.1×10^{-11}	1.9×10^{-10}	2.0×10^{-9}	1.9×10^{-8}
7	6	Commercial catch for combined Cannikin, Long Shot, and Milrow (with kelp)	4.2×10^{-12}	7.0×10^{-11}	7.9×10^{-10}	8.7×10^{-9}
8	3	Commercial catch for combined Cannikin, Long Shot, and Milrow (with no kelp)	4.2×10^{-12}	7.0×10^{-11}	7.4×10^{-10}	7.2×10^{-9}
9	9	Commercial catch for culture and communications area	8.9×10^{-13}	1.5×10^{-11}	1.5×10^{-10}	1.4×10^{-9}